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A STUDY OF FACTORS AFFECTING DIFFUSION OF INNOVATION

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ABSTRACT

Faced with a dynamically changing environment, marketers are always with regard to new product development. This could result in modification ranging from slight to moderate to large or the continuum, or even result in totally new product and service offerings. The two questions that face a marketer are, i) whether the modified/new product and service offering would be accepted by the segment(s), and ii) how quickly would the product and service offering be accepted by the segment(s). While the first pertains to what is referred to as diffusion, the second pertains to what is known as adoption. The two concepts are the basis for this research papers. The research is based on the study to understand the relationship between the five factors: the rate of adoption are relative advantage, compatibility, complexity, trial ability, and observability and one of the demographic element –Education. Also we have tried to research on the strength of the relationship between the variable under study. For analysis chi-square test has been used.

KEYWORDS: Diffusion, Innovation Consumer Behavior, Education

INTRODUCTION

The diffusion of innovation and an adoption as a process is not generic; it varies from product to product and service to service. Some product or service offerings gain quick acceptance, and the diffusion is fast and rapid; for other products and services, the process may be slow and take considerable amount of time. For example, the colour TVs in India took a long time to get diffused, but for the satellite TV, the rate of diffusion was very fast. Also, the cordless telephone took a long time to get diffused into Indian homes, but the cell phone got readily accepted by all and diffusion was very fast. Thus, all products or services that are "new", do not possess the same ease and potential for consumer acceptance. Diffusion of innovation and subsequent adoption is impacted by socio-economic, cultural, technological as well as legal factors; it is also impacted by individual determinants like psychological variables and demographics; these are all forces are in most cases "uncontrollable" by the marketer. In this research paper the major emphasis is given to education which is one of the element of demographics.

There are also the more relevant forces, related to the innovative product and /or service which constitute what is called the "controllable", and which are in the hands of the marketer; these could be in the form of marketing communication or interpersonal communication etc and could be used by the marketer in a manner that facilitate quicker and easier acceptance of the innovative offering. Apart from these, there are also certain characteristics that an innovation possesses that can impact the diffusion and adoption process. Researchers have identified certain factors that can act as triggers and some that can act as barriers to the diffusion and adoption process.

There are certain product and service characteristics that affect the diffusion process and can influence consumer acceptance of new products and services; the five factors that can impact the diffusion process, and the rate of adoption are

relative advantage, compatibility, complexity, trialability, and observability.These factors on which this research paper focus on and tried to understand the relationship between these five factors and education.

LITERATURE REVIEW

Innovation

Consumers and managers respond in a diverse approach to innovative products relative to non-new products (e.g. Hoyer 1984). This is because the function of the new product is unidentified or uncertain which creates ambiguity, whereas for on hand products the utility is in fact much clearer (Fischer, Luce, and Jia 2000; Mahajan and Muller; March 1978). This requirement of precision leads consumers to process information regarding new products another way and to approach their decision to buy differently (Olshavsky and Granbois 1979; Wilton and Pessemier 1981). Consequently, the decision to buy a new product, i.e. adoption, is unlike the decision to buy an existing product (e.g. the same box of orange juice that someone buys every week).

Adoption

Adoption may be defined as 'a decision to make full use of an innovation as the best course of action available' (Rogers 2003). Hence, innovation adoption relates to consumers' individual decision making process with regard to the purchase and use of new products. This process is a complex reasoning process consisting of multiple stages (Gatignon and Robertson 1991; Mittelstaedt, Grossbart, Curtis, and Devere 1976; Rogers 2003). The process starts with first awareness of the new product and ends with the routinized use of the new product by the consumer (Rogers 2003).

Diffusion

Diffusion may be defined as 'the procedure by which an innovation is communicated through certain channels over time among the members of a social system' (Rogers 2003). Studies on innovation diffusion describe and predict the likely cumulative response of consumers to a new product in a market. Diffusion equals the sum of consumer adoptions in a market over time (Gatignon and Robertson 1985

There are a number of research studies that theoretically and empirically investigated the influence of lead users on the innovation process as they modify the existing products to be later developed by firms to become commercial products (von Hippel, 2005; Franke & Piller, 2003; Henkel & von Hippel, 2005; Lüthje & Herstatt, 2004; Franke, Von Hippel, & Schreier, 2006; van Oast, Verhaegh, & Oudshoorn, 2009, Hassan et al., 2010). It is argued that this lead-user innovation approach helps the firm reduce the risk of failure associated with introducing new products to the market. As a result, investigating the influence of lead users on accelerating diffusion rate offers far greater benefits in comparison with the traditional innovation diffusion models.Additionally, research indicated that cultural factors significantly influence the innovation adoption process (Karahanna, Evaaristo & Strite 2002; Meyers & Tan 2002; Huang et al. 2003). However, little research analyzed the effects of cultural factors on innovation acceptance and diffusion (Kalliny & Hausman 2007).

The characteristics, which forms the basis for what is regarded as perceived attributes theory, include:

- **Relative Advantage:** the degree in which an advantage is perceived as better than the idea it supersedes
- **Compatibility:** The extent to which an innovation is supposed as being constant with the on hand values, precedent experiences and needs of promising adopters.
- **Complexity:** The extent to which an innovation is supposed as complicated to realize and apply.

- **Trialability:** The extent to which an innovation may be experimented with on a limited basis.
- **Observability**: The extent to which the consequences of an innovation are practicable to others. The easier it is for individuals to see the results of an innovation,the more likely they are to adopt it. (Rogers, 1995, pp. 15-16)

Relative Advantage

The relative advantage of the innovative product/service offering over already existing products/services, accelerates its rate of adoption by the target market. The degree to which customers perceive a new product/service as superior to similar existing products determines the relative advantage. A product/service that provides advantage over other existing products is indicative of being superior to existing alternatives, and thus higher in terms of "value". The more radical a change, and the higher the relative advantage, the faster would be the diffusion. The relative advantage may lie in terms of it being a modified product (with better features, attributes, benefits, form etc), or at a lower price (better deals, discounts, terms of payment, warranty and exchange), or more accessible in terms of availability (physical store format, or virtual electronic format), or better communication. Thus, while product-based advantages are more attractive in nature, the other components of the marketing mix like price, place and promotion can also provide a basis for relative advantage. Examples of innovations that provide relative advantage are, flash drives versus compact discs, laptops versus computers, or digital libraries versus traditional libraries, ATMs versus bank teller counters.

Compatibility

The compatibility of the innovative product and service offering with the existing backgrounds, behavior and lifestyle patterns of consumers also affects its adoption by the consuming public. The compatibility of a product/service measures how closely it relates to needs, value systems and norms, lifestyles, culture etc. The higher the level of compatibility, the quicker the diffusion; and the lower the compatibility, the slower the diffusion. A product will diffuse more quickly if it does not require consumers to change their values, norms, lifestyles, cultures and day to day behaviors.

Continuous and dynamically continuous innovations are higher on compatibility than discontinuous innovations. Fast food in the form of pizzas, burgers, noodles etc. took considerable amount of time to get diffused into the Indian society, as it contrasted heavily with the dal roti meal concept. The pace of adoption quickened in the 1990s and more so in the 2000s with the new generation, and their preference towards packaged foods and fast food. Another example that can be mentioned here is, coconut oil as a medium of cooking would be incompatible to people staying in North India. Even if positioned as "healthy and natural cooking medium", it would be slow to penetrate and may even fail if launched in North India. The same would penetrate easily in South India, as it is culturally more compatible.

Complexity

The level of complexity in a product purchase and usage also affects the diffusion process. An innovative offering would be easily diffused when there is ease of understanding, purchase and use. The easier it is to understand and use a product, the more likely it is to be accepted quickly, and vice versa.

While speaking of complexity, technological complexity acts as a barrier to diffusion. People resist adoption of new products because of fear of complexity in purchase and usage. This is well understood by high tech industries. Let us take the example of the electronic goods industry, eg microwave owens or vacuum cleaners. While designing their communication, the marketer illustrates ease of use, so as to encourage quicker acceptance; prospects are provided with demos and trials; once purchased, arrangements are made for providing installation at home. Another example is the mobile phone industry; realizing the problem of complexity, simpler models are introduced for those who desire the mobile

set just for making and receiving calls and sms'es.It would be noteworthy to mention here that the youth are more techno savvy and have accepted electronic goods like MP3s and 4s, laptops, I-pods, ATMs etc much faster than the older generation. This is because the former have been able to deal with the complexity with a higher level of comfort than the older generation.

Trialability

The ease with which the product or service can be tested and tried also determines the rate of acceptance. The higher the degree of trialability, the greater would be the rate of diffusion. This is because the prospects get an opportunity to try the product/service, assess it and decide to accept/reject it. Trialability can be encouraged by providing free samples, or providing smaller packs and smaller-than-average sizes, (for FMCG and household goods) or even through demos and test runs (for consumer durables). Consumers could try out the innovative offering, evaluate it and thendecide on a purchase commitment by accepting/rejecting it. Trials leading to purchase can be encouraged through guaranty and warranty schemes. Such trials encourage a product/service to be diffused easily.

Observability

Observability refers to the ease with which the product can be observed. Observability in an innovative product refers to the degree to which a product/service's benefits can be observed, imagined and perceived by a potential consumer. The higher the degree of observability, the greater the chances of the innovative offering being accepted by the prospects.

Those new product offerings that are i) tangible, ii) have social visibility, and iii) whose benefits are readily observed (without much time gap), are more readily diffused than those that are intangible, or have no social visibility or whose benefits accumulate over long periods of time. Thus, relative advantage, compatibility, complexity, trialability, and observability have an impact on the rate of diffusion. While all these factors relate to the product, they are dependent on consumer perception which further lead to purchase . A product/service offering that is relatively superior to existing ones, is more compatible to existing consumption behavior and usage, is less complex, easy to use and observable, is more likely to be purchased quickly by the public, than when it is not.

Barriers to the Diffusion of Innovation/Adoption Process

There are also certain factors that negatively affect diffusion of innovation and subsequently the adoption process. These barriers have been dealt with extensively by consumer researchers and incorporated even in models on innovation resistance. They could range at the micro level from product characteristics, to the more macro, socio-cultural, economic, situational and technological forces. While product characteristics like relative advantage, compatibility, trialability, and observability, do boost the rate of diffusion and adoption, perceived complexity in purchase and usage of innovative offerings, retard the process. Innovations could also meet resistance from socio-cultural, economic, situational and technological forces. The innovative offering may not with compatible with social norms, values and lifestyle; or may not go well with the economic strata; or be technologically complex, leading to fear to usage, obsolescence and risk. The basic barriers to the diffusion process and subsequent adoption are as usage, value, risk and psychological factors.

Objective of the Study

- To understand the different type of buyers in the market and their relationship with their timing* of when they purchase the product.
- To measure the impact of education on diffusion process with reference to **Innovation characteristics** **

- To measure the strength of relationship between **Adopter characteristic*** ** and product **Innovation characteristics** **.
- To study the correlation between **Adopter characteristic and Innovation characteristics.**

*** Announcement of arrival, when launched, after reviewing, price nominal reduction.**

**** Comparibility, Complexity, Relative advantage, Trial-ability, Observability**

***** Education**

Hypothesis

H_{01}: There is no relationship between type of buyers in the market and their relationship with their timing* of when they purchase the product.

H_{11}: There is relationship between type of buyers in the market and their relationship with their timing* of when they purchase the product

H_{02}: Education has no impact on diffusion process with reference to Innovation characteristics**.**

H_{12}: Education has an impact on diffusion process with reference to Innovation characteristics**.**

H_{03}. There exist no correlation between Adopter characteristic and Innovation characteristics.

H_{13}. There exist a correlation between Adopter characteristic and Innovation characteristics.

Research Methodology

Data has been collected through both ways i.e. primary and secondary methods. Lot of desk research has also been done; Books, Magazines and internet have been referred.

Primary Data

- Questionnaire
- Series of interviews

Secondary Data

- Internet sources
- Various articles which appear in newspapers

Data Analysis

Sample Size: The research methodology adopted would be exploratory survey with the help of structured questionnaire and interview. The sample size for survey will be 100 for the customers

DATA ANALYSIS

H_{01}: There is no relationship between type of buyers in the market and their relationship with their timing* of when they purchase the product

Table 1

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-S8quare	47.699[a]	6	**.000**
Likelihood Ratio	54.217	6	.000
Linear-by-Linear Association	.152	1	.697
N of Valid Cases	99		

a.4 cells (33.3%) Have Expected count less than 5. The Minimum Expected count is 2.69.

Since the Sig value is .000, we can say that there is a significant relationship between **type of buyers in the market** and their **timing* of when they purchase** the product. Hence we reject null hypothesis and accept alternative hypothesis .

H_{02}: Education has no impact on diffusion process with reference to Innovation characteristics**.(Comparability)**

Table 2

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	16.456[a]	2	.000

a 3 cells (50.0%) have expected count less than 5. The minimum Expected count is .91.

Since the Sig value is .000, we can say that there is a significant relationship between **education** and **Comparability** which influence the diffusion of the products. The same is also been depicted by the graph. Hence we reject null hypothesis and accept alternative hypothesis w.r.t significant relationship between **education** and **Comparability**

H_{02}: Education has no impact on diffusion process with reference to Innovation characteristics**. (complexity)**

Table 3

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	10.062[a]	2	.007

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.18.

Since the Sig value is .007, we can say that there is a significant relationship between **education** and **complexity** which influence the diffusion of the products. Hence we reject null hypothesis and accept alternative hypothesis w.r.t significant relationship between **education** and **Complexity.**

H_{02}: Education has no impact on diffusion process with reference to Innovation characteristics**. (Trial Ability *)**

Table 3

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	13.026[a]	2	.001

a. 2 cells (33.3%) have expected count less than 5. The minimum expected count is 2.73.

Since the Sig value is .001, we can say that there is a significant relationship between **education** and **education**

which influence the diffusion of the products.Hence we reject null hypothesis and accept alternative hypothesis w.r.t significant relationship between **education** and **Trial Ability.**

H_{02}: Education has no impact on diffusion process with reference to Innovation characteristics**. (observability)**

Table 4

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	4.562[a]	2	.102
Likelihood Ratio	7.569	2	.023
Linear-by-Linear Association	2.634	1	.105
N of Valid Cases	99		

a.2 cells (33.3%) have Expected count less than 5.
The Minimum Expected count is 3.09.

Since the Sig value is .102, we can say that there is no a significant relationship between **education** and **observability** which influence the diffusion of the products. Hence we accept null hypothesis and reject the alternative hypothesis w.r.t significant relationship between **education** and **observability.**

H_{02}: Education has no impact on diffusion process with reference to Innovation characteristics**.**

(Relative Advantage)

Table 4

Chi-Square Tests			
	Value	**df**	**Asymp. Sig. (2-sided)**
Pearson Chi-Square	29.362[a]	4	.000

a.2 cells (22.2%) have Expected count less than 5.
The Minimum Expected count is 3.45.

Since the Sig value is .000, we can say that there is a significant relationship between **education** and **relative advantage** which influence the diffusion of the products.Hence we reject null hypothesis and accept alternative hypothesis w.r.t significant relationship between **education** and **relative advantage.**

Objective 3: To measure the strength of relationship between **Adopter characteristic*** ** and product **Innovation characteristics** **.

Table 5

Symmetric Measures			
		Value	**Approx. Sig.**
Nominal by Nominal	Phi	.545	.000
	Cramer's V	.385	.000
N of Valid Cases		99	

The **value is .545** which shows a moderate strength of relationship between education and compatibility and the **significance level is .000**, which is very significant, which means the relationship is generalisable to the population.

Table 6

Symmetric Measures			
		Value	**Approx. Sig.**
Nominal by Nominal	Phi	.215	.102
	Cramer's V	.215	.102
N of Valid Cases		99	

The result of the significance test for this relationship is .102, which is larger than .05. So the relationship among education and complexity is not statistically significant. There is a probability that 102 times in 1,000 the outcome established in the sample is owed to sampling error and is not a exact association for the population from which the sample is drawn. So is not generalisable to the population"

Table 7

Symmetric Measures			
		Value	**Approx. Sig.**
Nominal by Nominal	Phi	.363	.001
	Cramer's V	.363	.001
N of Valid Cases		99	

The **value is .364** which shows a weak strength of relationship between education and trial ability and the **significance level is .001**, which is significant, which means the relationship is generalisable to the population

Table 8

Symmetric Measures			
		Value	**Approx. Sig.**
Nominal by Nominal	Phi	.319	.007
	Cramer's V	.319	.007
N of Valid Cases		99	

The **value is .319** which shows a weak strength of relationship between education and **observability** and the **significance level is .007,**which is significant, which means the relationship is generalisable to the population

Table 9

Symmetric Measures			
		Value	**Approx. Sig.**
Nominal by Nominal	Phi	.408	.000
	Cramer's V	.408	.000
N of Valid Cases		99	

The **value is .408** which shows a weak strength of relationship between education and relative advamtage and the **significance level is .000,**which is very significant, which means the relationship is generalisable to the population

Table 10

Correlations							
		Education	**Comparibility**	**Complexity**	**Trial Ablity**	**Observability**	**Relative Advantage**
Education	Pearson Correlation	1	**.334****	.035	.039	-.164	-.190

The correlation value between education and comparability is .334 which is significant which concludes the as the education of the consumer increase the influence comparability factor also influences.

CONCLUSIONS

Survey results gave insights to understand the different type of buyers in the market and their relationship with their timing of when they purchase the product. To measure the impact of education on diffusion process with reference to Innovation characteristics To measure the strength of relationship between Adopter characteristic and product Innovation characteristics .

This paper advances an integrative model of innovation diffusion that incorporates the possession of innovation attributes, lead users, opinion leaders and cultural factors on innovation acceptance and diffusion.

REFERENCES

1. Agarwal, R. and B.L. Bayus (2003), "The Market Evolution and Sales Takeoff of Product Innovations," Management Science, 48 (8), 1024-41.
2. Ajzen, I. and J. Sexton (1999), "Depth of Processing, Belief Congruence, and Attitude-Behavior Correspondence," in S. Chaiken & Y. Trope (Eds.) Dual-process theories in social psychology, Ed. New York: Guilford Press.
3. Biyalogorsky, E., W. Boulding, and R. Staelin (2006), "Stuck in the Past: Why Managers Persist with New Product Failures," Journal of Marketing, 70 (April), 108-21.
4. Chandy, R., B. Hopstaken, O. Narasimhan, and J. Prabhu (2006), "From Invention to Innovation: Conversion Ability in Product Development," Journal of Marketing Research, 43 (August), 494-508.
5. Diamantopoulos, A. and H.M. Winklhofer (2001), "Index Construction with Formative Indicators: An Alternative to Scale Development," Journal of Marketing Research, 38 (May), 269-77.
6. Henard, D.H. and D.M. Szymanski (2001), "Why Some New Products Are More Successful Than Others," Journal of Marketing Research, 38 (August), 362-75